



U.S. ARMY CHEMICAL MATERIALS AGENCY

DF and QL neutralents

This information sheet describes the waste products produced by destroying DF and QL, two compounds used to create nerve agents. These components, also called binary precursor chemicals, are chemicals that the U.S. Army Non-Stockpile Chemical Materiel Project (NSCMP) is destroying under terms of the Chemical Weapons Convention (CWC). DF and QL, stored at Pine Bluff Arsenal, Ark., since the late 1980s, make up one of the largest volumes of chemical warfare materiel that NSCMP will destroy.

For the chemical treatment, the U.S. Army renovated the Multiple Launch Rocket System building, part of the Integrated Binary Production Facilities, into the Pine Bluff Binary Destruction Facility (PB BDF). PB BDF neutralization operations began December 2005 and concluded in September 2006.

Processing DF neutralent

DF, a clear, non-flammable liquid, has a strong acid-like odor. The compound can be combined with a second component to form the nerve agent sarin (GB). To destroy DF, operators add water to react with DF. The wastewater that results from this reaction process, while now free of DF, will contain hazardous byproducts that need additional treatment before disposal. DF operations ended on April 6, 2006. The estimated 155,000 gallons of DF neutralent waste were shipped to Texas Molecular, Inc. in Deer Park, Texas, for treatment.

Processing QL neutralent

QL, a thick, colorless liquid in its original form, has a strong, fishy smell. QL, when combined with a second non-lethal compound, makes the nerve agent VX. Like DF, QL mixes with water for destruction.

What compounds were in DF and QL neutralents?

- **DF neutralent contained about 70 percent water, about 21 percent methylphosphonic acid, almost 9 percent hydrogen fluoride and trace amounts of sodium fluoride.**
- **QL neutralent contained about 82 percent water, about 10 percent diisopropylaminoethanol, slightly more than 5 percent methylphosphonic acid, about 3 percent ethanol and trace amounts of sodium hydroxide.**

The QL neutralent also contains byproducts that will require additional treatment before final disposal. QL operation ended on Sept. 27, 2006, generating approximately 80,000 gallons of QL neutralent.

Final disposal process

The hazardous byproducts from the neutralization process will be destroyed using wet air oxidation (WAO). Two scientific panels conducted a two-year review of WAO, chosen from more than 100 alternative destruction technologies that NSCMP investigated. Shaw Environmental, NSCMP's waste management support contractor, selected and proposed use of WAO technology. The recommendation, important for meeting CWC treaty requirements, was based on tests that showed that WAO will break down chemicals and chemical bonds in the wastewater.

DF neutralent contains about 70 percent water, about 21 percent methylphosphonic acid, almost 9 percent hydrogen fluoride and trace amounts of sodium fluoride. QL neutralent contains about 82 percent water, about 10 percent diisopropylaminoethanol, slightly more

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DF and QL neutralents (continued)

than 5 percent methylphosphinic acid, about 3 percent ethanol and trace amounts of sodium hydroxide.

NSCMP disposes of chemical materiel in a safe, environmentally sound and cost-effective manner, ensuring compliance with the CWC. This does not include items that are part of the Army's chemical weapons stockpile, and it may include chemical ingredients and equipment used to produce some types of weapons, buried items

recovered from military ranges and test kits once used to determine exposure to chemical weapons. The project emphasizes the importance of engaging a spectrum of individuals and organizations involved in or potentially affected by disposal of chemical materiel, and it offers opportunities for public involvement, including small-group and other public meetings and workshops.